

# Gas Transfer Type Vacuum Pumps

## Course Overview

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## Courses in This Series

- Vacuum Fundamentals
- Gas Sources and Conductance
- Gas Transfer Type Vacuum Pumps
- Entrapment Type Vacuum Pumps
- Vacuum Gauges
- Leak Detection in Vacuum Technology
- Mass Flow Controllers



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## About This Course

- The purpose of a vacuum pump is to remove gas molecules from the process chamber and to achieve and maintain a desired vacuum.
- Selection criteria for vacuum pumps include the following parameters: Operating range, ultimate pressure, inlet pressure, outlet pressure, pumping speeds, selectivity, and backstreaming.

## About This Course (cont.)

- The primary focus of this course is on the applications, theory of operation, operating parameters and preventative maintenance requirements for common pumps found in today's semiconductor industry.
- This course discusses gas transfer pumps including operating ranges and pump specifications. Gas transfer pumps transfer gas through the pump from the inlet to the outlet. They include positive displacement pumps and momentum transfer pumps.

## About This Course (cont.)

- Positive displacement pumps include rotary vane, rotary piston, rotary lobe, oil-free diaphragm, multi-stage, and scroll pumps.
- Momentum transfer pumps include turbomolecular and diffusion pumps.
- This course develops the learner's ability to identify a variety of gas transfer pumps and to know how each pump is used in developing and maintaining a vacuum system.



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Knowledge On Demand™

## About This Course (cont.)

- The learner will develop the ability to discuss how each type of pump achieves a vacuum and in what range the pump is used.
- The learner will understand the factors that influence the selection of pumps and the overall factors that govern system design.
- The learner will also identify the preventative maintenance necessary to verify and maintain efficient pump operations.



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Knowledge On Demand™

## About This Course (cont.)

- Through this course, the learner will:
  1. Develop behaviors that demonstrate precision, care, and safety in operating manufacturing equipment
  2. Accurately read and interpret technical manuals
  3. Apply behavior of gases and gas laws to vacuum pump operation
  4. Apply basic principles of electronics, pneumatics, vacuum and electromechanical systems.

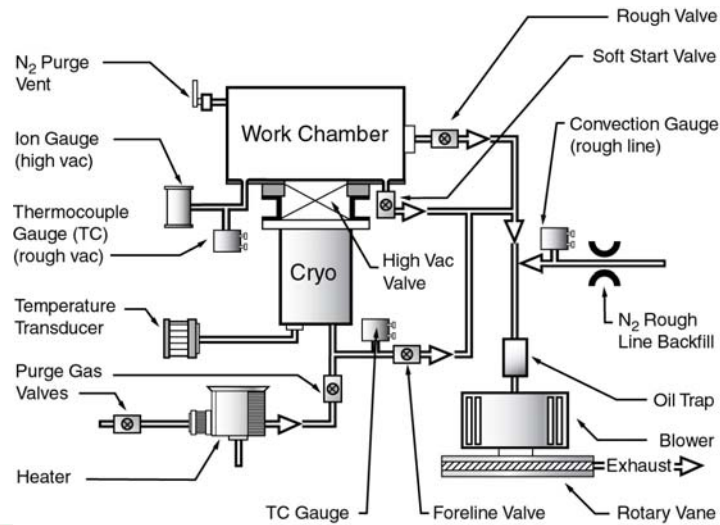


## Course Outline

- Introduction Module 0
- Study of a Vacuum System Module 1
- Research Equipment Manufacturers Module 2
- Positive Displacement Vacuum Pumps Module 3
- Momentum Transfer Vacuum Pumps Module 4
- Gas Transfer Pumps Questor Module 5
- Vacuum Technology Module 6
- Performance Assessment  
(Multiple-Choice Test)



# Pumpdown Sequence



# Learning Objectives

- Identify vacuum system components.
- Describe crossover pressure, base pressure and ultimate pressure (pump).
- Outline the pumpdown sequence.
- Describe 2 methods to reduce backstreaming in the rough line.
- Identify the gas transfer pumps used in the rough and high vacuum ranges.

## Learning Objectives (cont.)

- Describe the theory and mechanism of action of a gas transfer pump.
- Relate the function and spec's of a gas transfer pump to the pressure range and intended application.
- Distinguish between positive displacement pumps and momentum transfer pumps.
- Distinguish the features of oil-sealed versus oil-free pumps.
- State unique applications for each type of momentum transfer pumps.

## Learning Objectives (cont.)

- State two types of momentum transfer pumps.
- Interpret vacuum system schematics.
- Use the Internet to research technical aspects, facts and detailed information on vacuum pumps and equipment suppliers.
- Interpret specification data for a vacuum system.

## Learning Objectives (cont.)

- Operate simulated manufacturing equipment.
- Design a vacuum pumping system.
- Develop the behaviors necessary to maintain the integrity of a vacuum system.
- Demonstrate behavior necessary to verify and maintain efficient pump operation.

## Additional Course Information

- Instructional Area: Vacuum Technology
- Participant Level: A.A. or A.A.S. degree or equivalent (Technician Training)
- Target Competency: Learners will apply knowledge gained in this course to design a pumping system for a vacuum chamber.
- Prerequisites: Vacuum Fundamentals

## Course Developers

- **MATEC:**
  - ❑ Instructional Design: Phyllis J. Cooke, Kim Grady, and Joseph Mattoon
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- **Content Repurposing, Expert Review, and Updates:**
  - ❑ MATEC and Semizone



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## Who Should Take the Course

- **Semiconductor wafer fab personnel:**
  - ❑ Equipment technicians and operators
  - ❑ Process technicians
  - ❑ Repair and maintenance technicians
- **Semiconductor wafer fab new hires**
- **Semiconductor equipment industry personnel**
- **Field service personnel**
- **Anybody working with vacuum equipment**
- **Course designed to fulfill employment-ready competency needs for fab technicians**



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## Course Organization and Delivery

- Self-paced online modules comprising HTML-based lessons and animations
- Course available for access on demand, anytime and anywhere
- One-year course access upon enrollment
- Final performance assessment:
  - Multiple-choice quiz (required for certificate)
- Course certificate by Semizone and MATEC



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